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Agency

Office of
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EPA/ROD/R03-88/042
March 1988

EPA

Superfund Record of Decision:

Ordnance Works Disposal, WV

50272-101

REPORT DOCUMENTATION PAGE

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SUPERFUND RECORD OF DECISION
Ordnance Works Disposal, WV
First Remedial Action

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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Ordnance Works Disposal site, also known as the Morgantown Ordnance Works, is located one mile south of Morgantown, West Virginia. The Monongahela River is adjacent to the site with a fairly steep cliff separating the river from portions of the site. Remediation for this first operable unit focuses on the waste disposal area which consists of an inactive landfill, two former lagoons and the surrounding impacted area, and a scraped area of bare soil. These areas are located within an industrial tract of over 800 acres of which 670 acres are owned by Morgantown Industrial Park Association, a group of private individuals who joined together to purchase the Ordnance Works property in 1982. Prior to this, the site was owned by numerous companies and used for a variety of chemical production operations. The landfill covers a surface area of approximately 1.6 acres. The landfill was reportedly used from 1942 until 1962, for the disposal of various solid chemical wastes. Waste materials identified included: construction debris, slag, ash, and catalyst pillets. Arsenic and carcinogenic PAHs (CPAHs) were detected in the soils at concentrations exceeding risk-based cleanup levels. The former lagoon and the surrounding area, located adjacent to the landfill, cover a surface area of 3 to 4 acres. This area is relatively flat with a cinder-like surface layer and sparse vegetation. Metal plating wastes were placed in the lagoon between
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Ordnance Works Disposal, WV
First Remedial Action
Contaminated Media: sediments, soil
Key Contaminants: inorganics (arsenic), organics (PAHs, PCBs)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 45
	20. Security Class (This Page) None	22. Price

(See ANSI–Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4–77)
(Formerly NTIS–35)
Department of Commerce

16. ABSTRACT (continued)

1970 and 1976. The lagoons were excavated in 1981, by the responsible party, and the contents were disposed of offsite. The metals present in the soil are currently below the recommended cleanup levels. CPAHs have been identified at levels exceeding cleanup standards in the area adjacent to the lagoons. An oily, stained cinder material was observed in areas where CPAHs were detected. The scraped area, carving a surface area of approximately 162 acres, was an active disposal area for solid wastes from 1942 until 1962. The waste materials identified include: construction debris, oil-like stained soils, and catalyst pillets. Currently, arsenic and CPAHs exceed the proposed cleanup levels. The primary contaminants of concern affecting the soil and sediments include arsenic and CPAHs.

The selected remedial action for this site includes: consolidation of existing landfill waste and application of a multi-layer RCRA cap; excavation and onsite incineration of former lagoons and surrounding area, scraped area soil, and impacted stream sediments with onsite disposal of treatment residuals in the landfill prior to the installation of the cap (assuming the ash is not EP toxic); placement of clean fill in the excavated area, followed by grading and revegetation; implementation of surface management techniques for drainage and sediment control in the landfill area; ambient air monitoring; and post-treatment monitoring. The estimated present worth cost for [redacted]s remedial action is $6,718,000.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Ordnance Works Disposal Superfund Site - Operable Unit One
Morgantown, Monongahela County, West Virginia

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for this site developed in accordance with CERCLA, as amended by SARA and to the extent practicable, the National Contingency Plan.

The State of West Virginia has concurred on the selected remedy.

STATEMENT OF BASIS

This decision is based upon the administrative record (index attached). The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

Operable Unit One consists of an inactive landfill, two former lagoons, an area of bare soil where wastes were deposited (scraped area), and a former drum staging area. Operable Unit Two will focus on the Department of Defense industrial area for which only preliminary information is presently available.

The selected remedy, On-Site Incineration and Containment, is designed to treat, via incineration, soils of concern found in the scraped area and former lagoon area, along with sediments from the three streams that are located downgradient of the areas of concern. The incineration process will be conducted on-site with a mobile incinerator that will permanently destroy the organic contaminants. The ash generated from the incineration process will be tested for EP toxicity. Based on the level of inorganics present in the soil and sediments, it is anticipated that the ash will not be EP toxic and therefore, may be disposed in the on-site inactive landfill. Ash that tests positive for EP toxicity will be disposed at an off-site RCRA facility.

The selected remedy also includes the placement of a multi-layer RCRA cap on the inactive landfill. The cap will be extended into the subsurface clay to prevent surface water from infiltrating into the landfill and leachate from seeping out of the landfill.

Other actions include placement of clean fill in the excavated areas, surface management techniques for drainage and sediment control, revegetation, ambient air monitoring and post-treatment monitoring.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

3/31/88
Date

James M. Seif
Regional Administrator

Site Disposition and Summary of Remedial Alternative Selection for the Ordnance Works Disposal Superfund Site Operable Unit One

INTRODUCTION

The EPA investigation of the Ordnance Works Disposal site (aka Morgantown Ordnance Works) focuses on three areas of concern: the waste disposal area; the former drum staging area; and the Department of Defense (DOD) industrial area. This Record of Decision (ROD) will summarize the results of the Remedial Investigation/Feasibility Study (RI/FS) and will present a permanent remedy for remedial action. The DOD industrial area will be further evaluated and addressed as a second Operable Unit.

SITE LOCATION AND DESCRIPTION

The Ordnance Works Disposal site is located in Monongalia County on the west bank of the Monongahela River approximately 1 mile south of Morgantown, West Virginia (see Figure 1). The topography surrounding the site is mountainous, dominated by the Chestnut Ridge, a long anticlinal mountain in the Allegheny Mountain Range located seven miles east of Morgantown. At the Ordnance Work Disposal site, the elevation of the ground surface in the areas investigated ranged from 975 feet mean sea level (msl) to 1010 feet msl. The Monongahela River is adjacent to the site at 825 feet msl (see Figure 2), with a fairly steep cliff separating the river from the waste disposal area and former drum staging area. Approximately 4500 feet downstream of the waste disposal area the City of Morgantown (population 31,000) operates a drinking water intake which supplies the city with approximately 70% of its potable water.

The areas investigated are located within an industrial tract of over 800 acres of which 670 acres are owned by Morgantown Industrial Park Association; 62 acres are owned by Borg-Warner Chemicals, Inc.; 24 acres are owned by the Monongahela Railway Company; and 60 acres are owned by various private companies and individuals. The waste disposal area is located in the southern portion of the industrial development and consists of an inactive landfill (2 acres), two former lagoons and the surrounding impacted area (4 acres), and a scraped area of bare soil (2 acres). The former drum staging area is located approximately 1800 feet north of the waste disposal area and immediately west of the Borg-Warner South Plant. The DOD industrial area is located approximately 1400 feet north of the former drum staging area (see Figure 2).

Ground water at the Ordnance Works site occurs in the shallow unconsolidated sediments in a discontinous localized perched condition and in the deeper bedrock as a regional aquifer. The ground water flows eastward toward the Monongahela River.

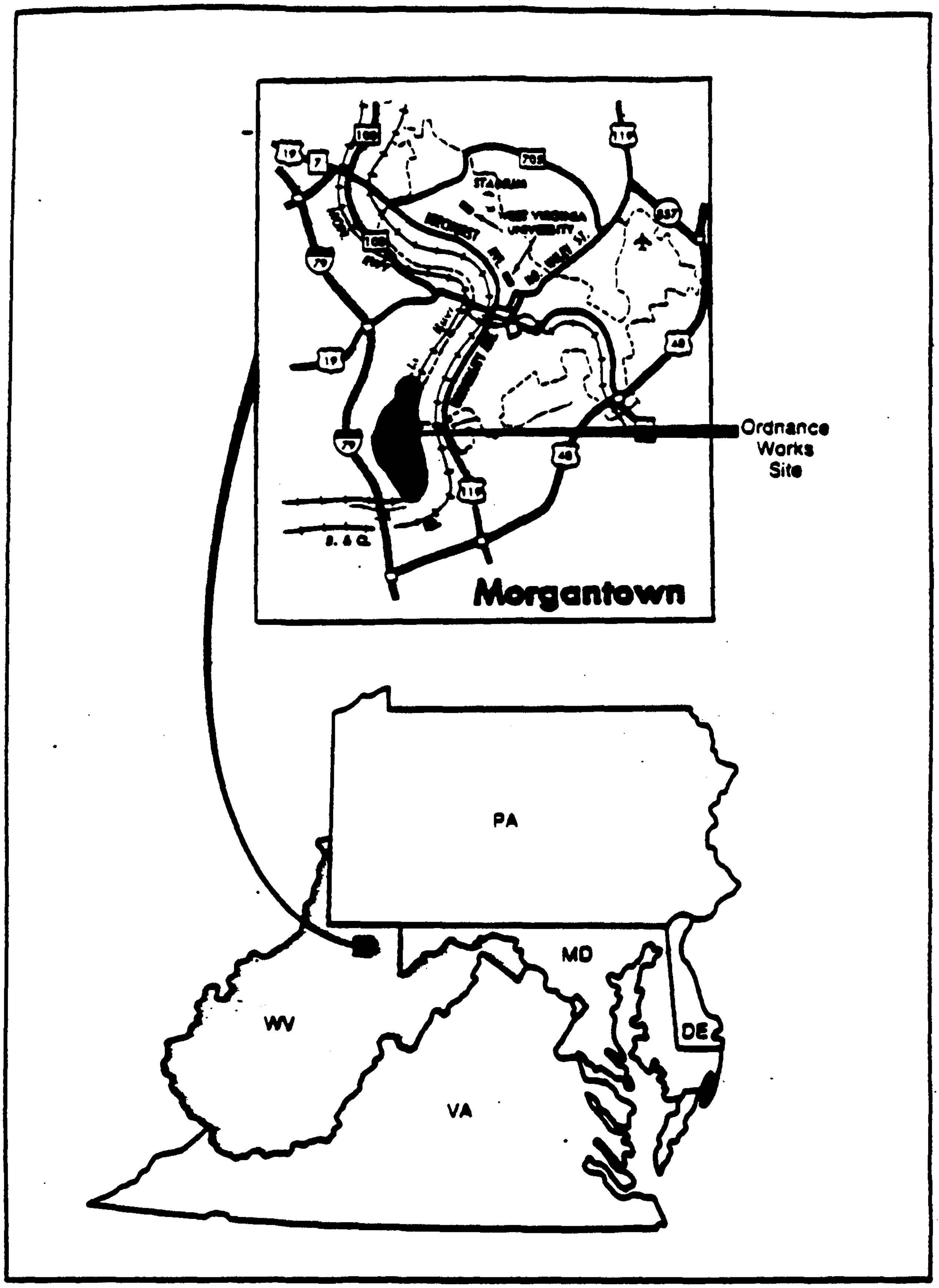

FIGURE 1 REGIONAL SETTING
ORDNANCE WORKS SITE, MORGANTOWN, WEST VIRGINIA

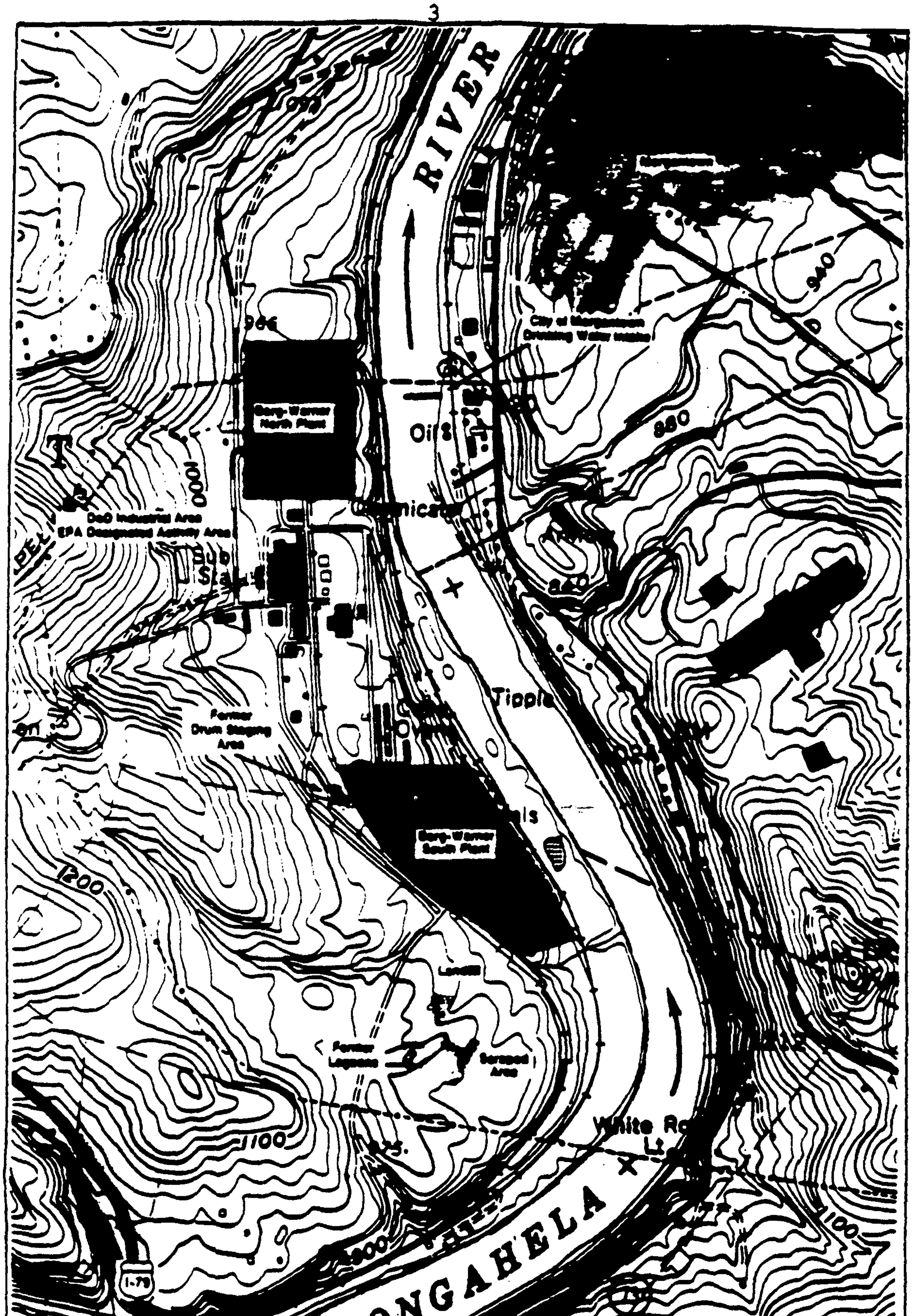

FIGURE 2 LOCATION OF INVESTIGATION SITES

SITE HISTORY

The Ordnance Works Disposal site has contained an active chemical production facility since its construction in the early 1940s. This facility was initially operated by private industries under agreement with the United States government, which owned the property between 1943-1962. E.I. du Pont de Nemours first produced hexamine from ammonia and methanol for the Department of War (now Department of Defense). Sharon Steel subsequently operated a coke plant; Heyden Chemical operated an ammonia production facility; and Olin Matheson later produced ammonia, methyl achohol, formaldehyde, hexamine, and ethylene diamine at the facility.

The United States government sold the property to Morgantown Ordnance Works, Inc. in 1962. This private corporation leased a portion of the site to Sterling Faucet, which operated a chrome-plating facility until 1976. Borg-Warner Chemical Corporation purchased a 62-acre parcel in 1964 and began operation of an organic chemical production facility. This chemical production facility is presently active.

Princess Coals, Inc. acquired the property in 1978, but did not actively lease or operate a chemical production facility. The Ordnance Works property was purchased by private individuals in 1982, who subsequently formed Morgantown Industrial Park, Inc. (MIP). MIP transferred the property to Morgantown Industrial Park Associates, the current property owner, in 1983.

Studies and remedial activities at the Ordnance Works Disposal site began in 1981. Table 1 summarizes the major sampling and remedial activities that occurred at the site prior to the RI/FS.

Table 1

Remediation/Sampling Chronology-Ordnance Works Disposal Site

Date	Event
March-September 1981	Two lagoons used for chrome plating waste disposal were excavated and their contents disposed of in an approved landfill by Rockwell International Corporation.
April 1983	Site inspection and sampling was undertaken by EPA's Region III FIT Team Samples were obtained from sealed and open drums. Also collected were water, soil, and sediment samples. Air samples were collected at locations throughout the site.

March 1984	Soil samples were collected by MSES Consultants, Inc. (contractor to Morgantown Industrial Park Associates) and analyzed for PCB contamination.
May-June 1984	Drums containing PCBs were staged in a secure storage area on-site and most were then disposed of at an approved off-site facility. This work was performed by MSES under contract to Morgantown Industrial Park Associates.
July 1984	Site inspection and sampling was performed by EPA's Region V FIT Team. Surface soils, surface runoff, and sediments were sampled during this program.
October 1984	PCB-contaminated soils were removed and disposed of by MSES under contract to Morgantown Industrial Park Associates.

CURRENT SITE STATUS

The major conclusions of the RI are summarized as follows:

Endangerment Assessment (EA)

An EA was performed to determine the potential impacts on public health and the environment that may result from the release of hazardous substances from the site. Risk-based cleanup levels for indicator chemicals were developed for arsenic (20 mg/kg), carcinogenic polynuclear aromatic hydrocarbons (CPAHs: 26 mg/kg), and mercury (175 mg/kg). A PCB cleanup level of 5 mg/kg was used based on EPA cleanup goals for industrial sites.

Landfill

The landfill covers a surface area of approximately 1.6 acres and is 16 to 20 feet deep. The landfill was reportedly used from 1942 until 1962, during which time where various solid chemical wastes were disposed of at this location by filling an existing ravine. Waste materials identified on-site included construction debris, slag, ash, and catalyst pellets.

Arsenic and CPAHs were detected in soils at concentrations that exceed risk-based cleanup levels of 20 and 26 mg/kg, respectively, in all test pits. Average arsenic concentrations for each test pit were 24 mg/kg for test pit 1; 170 mg/kg for test pit 2; and 28 mg/kg for test pit 3. Average CPAH concentrations for each test pit were 280 mg/kg for test pit 1; 79 mg/kg for test pit 2; and 33 mg/kg for test pit 3.

Analyses of vertical profile samples within the landfill showed that the upper 12 feet contain the highest concentrations of Hazardous Substance List (HSL) organic and inorganic contaminants. The average arsenic concentration decreased from 93 mg/kg (0 to 12 feet) to 16 mg/kg (12 to 20 feet). The average CPAH concentrations decreased from 219 mg/kg (0 to 12 feet) to 3.6 mg/kg (12 to 20 feet).

Former Lagoon Area

The former lagoons and the surrounding area, located adjacent to the landfill, cover a surface area of 3 to 4 acres. This area is relatively flat with a cinder-like surface layer and sparse vegetation. A subsidiary of Rockwell International Corporation placed metal plating wastes in the lagoons between 1970 and 1976. In 1981, Rockwell excavated the lagoons and disposed of their contents in an approved landfill. That HSL metals concentrations are presently below cleanup levels in the former lagoon areas may be the result of Rockwell's efforts at this location.

In the area adjacent to the two lagoons, CPAHs have been identified at concentrations that exceed the risk-based cleanup level of 26 mg/kg. The area is approximately 0.7 acres and extends to a depth of 6 feet. The maximum CPAH concentrations detected were 31,800 mg/kg at test pit 8 and 750 mg/kg at boring 7. An oily, stained cinder material was observed in areas where CPAHs were detected.

Scraped Area

The scraped area covers a surface area of approximately 1 to 2 acres and was an active disposal area for solid wastes from 1942 until 1962. The waste materials identified (generally at depths of less than 4 feet) are construction debris, oil-like stained soils, and catalyst pellets.

Chemical analysis of soil and fill in the scraped area revealed concentrations of metals and CPAHs. Arsenic concentrations exceeded the proposed riskbased cleanup level of 20 mg/kg at only one sampling location (114 mg/kg in test pit 2), while total CPAHs equalled the proposed risk-based cleanup concentration of 26 mg/kg in an adjacent sampling location (test pit 3 composite).

Drum Staging Area

Drums that were originally scattered throughout the site were collected, staged, and sampled in 1984 in the drum staging area. Prior to remediation, one soil sample at this location contained 229 ppm PCBs. In October 1984, PCB-contaminated soils were removed and disposed of by MSES Consultants, Inc. under contract to Morgantown Industrial Park Associates. The RI/FS verified that all samples of the native soil and the slag backfill material were below the cleanup level of 5 mg/kg.

DOD Industrial Area

The area surrounding the abandoned DOD process and utility buildings were designated by EPA Region III as an area of concern based on reports of chemical spills of both organic and inorganic materials in that area. Mercury was detected at one sampling location at 455 mg/kg (exceeding the risk-based cleanup level of 175 mg/kg). CPAHs were detected at 30 mg/kg at one location, slightly aboved the risk-based cleanup level of 26 mg/kg. Nearly 50 hand augered borings failed to reveal vapors containing volatile organic constituents. Sampling in this area was limited to the surface (maximum depth of 2 feet). Additional data to evaluate migration pathways and potential source locations are required to complete the assessment of this area.

Surface Water/Sediments

Analytical data from surface-water sampling indicate that the concentrations of constituents of concern are below the EA risk-based cleanup levels. As a result, this medium is not currently considered to be a primary migration pathway for site contaminants.

CPAHs were detected at levels above the risk-based cleanup criteria (26 mg/kg) at four sediment sampling locations (stream 1: sample point 3, 280 mg/kg; sample point 2, 37 mg/kg; stream 2: sample point 6, 111 mg/kg; and stream 3: sample point 8, 318 mg/kg).

Arsenic was detected at levels above the risk-based cleanup criteria (20 mg/kg) at three sediment sampling locations (stream 1: sample point 3, 253 mg/kg; sample point 9, 21.2 mg/kg; and stream 3: sample point 8, 20.6 mg/kg).

Stream 1 is located downgradient from the former lagoon area and the scraped area. A seep from the scraped area feeds the stream at sample point 9. Stream 2 is located downgradient of the scraped area. The source of stream 2 is surface drainage from the scraped area, along with ground water springs whose source is probably a localized perched ground water zone. The maximum depth of streams 1 and 2 is three inches and the maximum width is two feet and one foot, respectively. Stream 3 is located downgradient of the landfill. The source of stream 3 is a large seep from the northeast corner of the landfill and its flow is supplemented with ground water springs at various downstream locations. This stream ranges from four to six feet wide and has a maximum depth of four inches. All three streams flow into the Monongahela River.

Ground Water

Ground water occurs in the sandstone bedrock under confined conditions. The flow direction is easterly toward the Monongahela River. No direct ground water users have been identified between the areas of concern and the Monongahela River.

Iron and manganese were detected in ground water at levels above drinking water standards. The EA indicated that the concentrations of iron and manganese do not impact the drinking water source (the Monongahela River), hence there is no indication that ground water is a migration pathway of concern for site contaminants.

Contaminant-Specific Applicable or Relevant and Appropriate Requirements (ARARs)

Tables 2, 3, and 4 summarize the Federal and State contaminant-specific ARARs relevant to the investigation of the Ordnance Works Disposal site. The specific standards and criteria reviewed include Resource Conservation and Recovery Act Requirements, Federal Drinking Water Standards, Federal Ambient Water Quality Criteria, National Air Quality Standards, and the West Virginia Water Quality Standards that have been established by the Water Resources Board. The West Virginia Air Pollution Control Commission has adopted regulations conforming to the National Ambient Air Quality Standards for all contaminants except lead.

IDENTIFICATION OF EXPOSURE PATHWAYS

Based on a review of data from the RI, several potential exposure pathways were identified and evaluated. Separate exposure pathways are considered for both a current use scenario and a future use scenario. The current use scenario focuses on the potential impact of leachate seeps, ground water recharge, and soil erosion on the Morgantown drinking water supply, consumers of fish from the Monongahela River, and aquatic species in the river. The future use scenario assumes that a building will be constructed on-site and focuses on the risks to workers who may be exposed to contaminated soils through direct contact or from the generation of dust during construction activities. Exposure pathways for the current use and future use scenarios are summarized in Table 5.

TABLE 2

SUMMARY OF APPLICABLE, APPROPRIATE, AND RELEVANT STANDARDS AND CRITERIA

	DRINKING WATER (mg/L)		AMBIENT WATER QUALITY CRITERIA (mg/L) ***FOR PROTECTION OF HUMAN HEALTH***				AMBIENT WATER QUALITY CRITERIA (mg/L) ***FOR PROTECTION OF FRESHWATER AQUATIC LIFE***				RCRA
			TOXICITY PROTECTION		CARCINOGENICITY PROTECTION		EPA AMBIENT WATER QUALITY CRITERIA		LOWEST REPORTED TOXIC CONCENTRATION		EP TOXICITY (mg/L)
	RMCL	MCL	Ingesting Water and Organisms	Ingesting Organisms Only	Ingesting Water and Organisms	Ingesting Organisms Only	Acute	Chronic	Acute	Chronic	
URGEABLE ORGANICS											
ethylene Chloride			1.9 (e)								
cetone											
arbon Disulfide											
Butanone											
,1,1 Trichloroethane	0.2	0.2 (b)	18.4 (e)	1,030					52.8		
enzene	0	0.005 (b)	6.6E-03 (e)		6.6E-04				5.3		
Methyl 2 Pentanone											
Hexanone											
etrachloroethene											
oluene	2.0 (a)		14.3	424					17.5		
thylbenzene	0.680 (a)		1.4	3.28					32		
tyrene	0.140 (a)										
otal Xylenes	0.440 (a)										
/N/A EXTRACTABLE ORGANICS											
henol			3.5	769					10.2	2.56	
,2-Dichlorobenzene	0.062 (a)		0.4	2.6					2	2	
Methylphenol											
aphthalene									2.3	0.62	
Methylnaphthalene											
Phthalate			313	2,900					33		
cenaphthylene					2.8E-06 (f)	3.11E-08 (f)					
cenaphthene					0.020 (h)				1.7		
ibenzofuran											
uorene					2.8E-06 (f)	3.11E-08 (f)					
enanthrene					2.8E-06 (f)	3.11E-08 (f)					
thracene					2.8E-06 (f)	3.11E-08 (f)					
-N-Butylphthalate			34	154							
uoranthene			0.042	0.054			0.98		3.98		
rene					2.8E-06 (f)	3.11E-08 (f)					
utylbenzylphthalate									3.3	0.22	
nz(a)Anthracene					2.8E-06 (f)	3.11E-08 (f)					
is(2 Ethylhexyl)Phthalate			15	50					11.1	3E-03	
nzo(b)Fluoranthene					2.8E-06 (f)	3.11E-08 (f)					
nzo(k)Fluoranthene					2.8E-06 (f)	3.11E-08 (f)					
nzo(a)Pyrene					2.8E-06 (f)	3.11E-08 (f)					

TABLE 2

(CONTINUED)

	DRINKING WATER (mg/L)		AMBIENT WATER QUALITY CRITERIA (mg/L) ***FOR PROTECTION OF HUMAN HEALTH*** TOXICITY PROTECTION		CARCINOGENICITY PROTECTION		AMBIENT WATER QUALITY CRITERIA (mg/L) ***FOR PROTECTION OF FRESHWATER AQUATIC LIFE*** EPA AMBIENT WATER QUALITY CRITERIA		LOWEST REPORTED TOXIC CONCENTRATION		RCRA
	RMCL	MCL	Ingesting Water and Organisms	Ingesting Organisms Only	Ingesting Water and Organisms	Ingesting Organisms Only	Acute	Chronic	Acute	Chronic	EP TOXICITY (mg/L)
Indeno(1,2,3-cd)Pyrene					2.8E-06 (f)	3.11E-05 (f)					
Dibenz(a,h)Anthracene											
Benzo(g,h,i)Perylene					2.8E-06 (f)	3.11E-05 (f)					
Chrysene					2.8E-06 (f)	3.11E-05 (f)					
PESTICIDES/PCB s											
4,4' DDE			2.4E-07 (e)		2.4E-08	2.4E-08	1.1E-03	1.0E-06			
4,4'-DDT					2.4E-08	2.4E-08	1.1E-03	1.0E-06			
Aroclor 1016	0 (a)				7.9E-08	7.9E-08			2.0E-03		
Aroclor 1260	0 (a)				7.9E-08	7.9E-08			2.0E-03		
Alpha-BHC					9.2E-06	3.1E-08			0.1		
INORGANICS											
Cyanide			0.2				0.022	5.2E-03			
Aluminum											
Antimony			0.146	45					9	1.6	
Arsenic	0.05 (a)	0.05 (d)	2.2E-05		2.2E-06		[illegible]	0.19			5.0
Barium	1.5 (a)	1.0 (d)									100.0
Beryllium			3.7E-05		3.7E-06		0.13	0.0053			
Cadmium	0.005 (a)	0.010 (d)	0.01				3.9E-03 (g)	1.1E-03 (g)			1.0
Chromium	0.12 (a)	0.05 (d)	0.05				0.016	0.011			5.0
Cobalt											
Copper	1.3 (a)	1 (c)					0.018 (g)	0.012 (g)			
Iron		0.3 (c)									
Lead	0.020 (a)	0.05 (d)	0.05				0.083 (g)	3.2E-03 (g)			5.0
Magnesium											
Manganese		0.05 (c)									
Mercury	0.003 (a)	0.002 (d)	1.44E-04	1.46E-04			2.4E-03	1.2E-05			0.2
Nickel			1.34E-02								
Potassium			0.1				1.1	0.056			
Selenium	0.045 (a)	0.01 (d)	0.01				0.26	0.035			1.0
Silver		0.05 (d)	0.05				1.2E-03			1.2E-04	5.0
Sodium											
Tin											
Vanadium											
Zinc		5.0 (c)					0.18	0.047			

(a) Proposed RMCL Nov 13,1985
(b) Proposed Primary MCL Nov. 13,1985
(c) Secondary MCL
(d) Interim Primary MCL
(f) Value is for individual chemical or combinations of these chemicals.
(g) Assumes Calcium carbonate hardness of 100 mg/L.

TABLE 3

EPA AMBIENT AIR QUALITY CRITERIA

Chemical	Clean Air Act NAAQS (ug/cu m)
Carbon Monoxide	40,000 (1 hour)[a] 10,000 (8 hour)[a]
Hydrocarbons (nonmethane)	160 (3 hour)[a,b]
Lead[e]	1.5 (90 day)
Nitrogen Dioxide	100 (1 year)[c]
Particulate Matter	260 (24 hour)[a] 75 (24 hour)[d]
Sulfur Dioxide	365 (24 hour)[a] 80 (1 year)[c]

Chemical	Code of Federal Regulations 40 Part 50.7 (ug/cu m)
Particle Matter	150 (24 hour)[a] 60 (24 hour)[d]

[a]Annual maximum concentration not to be exceeded more than once a year.
[b]As a guide in devising implementation plans for achieving oxidant standards.
[c]Annual arithmetic mean concentration.
[d]Annual geometric mean concentration.
[e]Not adopted by the West Virginia Air Pollution Control Commission.

TABLE 4

WEST VIRGINIA WATER REGULATIONS APPLICABLE TO ORDNANCE WORKS SITE AREA

CONSTITUENT	LIMIT (mg/L)	COMMENTS
Arsenic	0.050	
Barium	1.0	
Cadmium (Soluble)	0.001	0-35 mg/L Hardness as Calcium Carbonate
	0.002	36-75 mg/L Hardness as Calcium Carbonate
	0.005	76-150 mg/L Hardness as Calcium Carbonate
	0.010	>151 mg/L Hardness as Calcium Carbonate
Copper (Total)	0.005	0-50 mg/L Hardness as Calcium Carbonate
	0.010	51-80 mg/L Hardness as Calcium Carbonate
	0.015	81-120 mg/L Hardness as Calcium Carbonate
	0.020	121-160 mg/L Hardness as Calcium Carbonate
	0.025	161-200 mg/L Hardness as Calcium Carbonate
	0.050	201-260 mg/L Hardness as Calcium Carbonate
	0.060	261-280 mg/L Hardness as Calcium Carbonate
	0.075	281-300 mg/L Hardness as Calcium Carbonate
	0.085	301-320 mg/L Hardness as Calcium Carbonate
	0.115	321-340 mg/L Hardness as Calcium Carbonate
	0.145	>341 mg/L Hardness as Calcium Carbonate
Cyanide (as free cyanide HCN+CN-)	0.005	
Hexavalent Chromium (Total)	0.05	
Iron (Total)	1.5	May be modified to 3.5 mg/L upon State and EPA approval.
Lead	0.025	0-100 mg/L Hardness as Calcium Carbonate
	0.050	>101 mg/L Hardness as Calcium Carbonate
Mercury (Total)	0.0002	In water
	0.0005	Body burden
Nickel	0.050	
PCBs	0.000001	In water
	0.002	Fish body burden
Phenolic Materials	0.005	
Selenium	0.010	
Silver	0.001	0-50 mg/L Hardness as Calcium Carbonate
	0.004	51-100 mg/L Hardness as Calcium Carbonate
	0.012	101-200 mg/L Hardness as Calcium Carbonate
	0.024	>201 mg/L Hardness as Calcium Carbonate
Zinc	0.050	0-150 mg/L Hardness as Calcium Carbonate
	0.100	151-300 mg/L Hardness as Calcium Carbonate
	0.300	301-400 mg/L Hardness as Calcium Carbonate
	0.600	>401 mg/L Hardness as Calcium Carbonate

Monongahela River water hardness is expected to be in the range of 75-125 mg/L as calcium carbonate based on data received from the Morgantown Water Commision.

Table 5

POTENTIAL EXPOSURE PATHWAYS-ORDNANCE WORKS DISPOSAL SITE

Exposure Medium	Potential Contaminant Source	Transport Mechanism	Exposure Point/Exposed Population	Potential Exposure Route
		Current Use Scenario		
Surface Water	Leachate seeps, surface soils, ground water	Surface-water runoff, erosion, ground water recharge	Drinking water from the Monongahela River, consumers of fish, aquatic life	Ingestion of river water, ingestion of fish, adverse effects on aquatic life
		Future Use Scenario		
Soil	Contaminated soils	Direct contact during construction	On-site construction workers	Ingestion of soil, dermal contact
Air	Contaminated soils	Dust generation during construction	On-site construction workers	Inhalation of dust

RISK TO AFFECTED RECEPTORS

The EA addressed the contaminants identified at the site. Seven inorganics (arsenic, cadmium, chromium, copper, lead, mercury, and zinc), CPAHs, and PCBs were chosen as indicator chemicals based principally on their on-site concentrations and toxicity relative to potential exposure pathways. The risk to affected receptors can be summarized as follows:

1. The excess lifetime cancer risks assuming ingestion of drinking water at the Morgantown intake and consumption of fish from the Monongahela River are on the order of 10^{-6} and 10^{-8} for arsenic and CPAHs, respectively, under average case exposure assumptions. Under maximum plausible case assumptions, the corresponding excess lifetime cancer risks are 10^{-4} for arsenic, 10^{-3} for CPAHs, and 10^{-5} for PCBs.

2. Under the future use worker exposure scenarios the excess lifetime cancer risk due to arsenic is on the order of 10^{-5} for the scraped area and landfill, and 10^{-7} for the lagoon area, assuming maximum plausible exposure conditions. Corresponding

risks due to CPAHs are 10^{-5} for the landfill, 10^{-4} for the lagoons, and 10^{-7} for the scraped area. Risks due to PCBs range from 10^{-7} to 10^{-9}. Excess lifetime cancer risks under average exposure conditions range from 10^{-6} to 10^{-8} for arsenic and CPAHs in the scraped area, landfill, and lagoon areas.

3. CPAHs may pose an additional excess cancer risk under the future use scenario due to dermal exposure. This risk cannot be quantified due to lack of toxicological data for this exposure.

4. Estimated drinking water intakes of the noncarcinogenic site contaminants (cadmium, chromium, copper, lead, mercury and zinc) are below toxicity reference doses under average and maximum plausible cases.

5. Estimated intakes of noncarcinogenic indicator chemicals under the future use worker exposure scenario are below toxicity reference doses.

6. The estimated concentrations of mercury in the Monongahela River at the mixing level exceed EPA's Ambient Water Quality Criterion (AWQC) for the protection of freshwater aquatic life under maximum plausible case assumptions. This is attributed to the high mercury concentration detected in the DOD area. Estimated concentrations of all other indicator chemicals at the mixing level are below AWQC.

7. Estimated concentrations of contaminants at the Morgantown drinking water intake runoff from the site do not exceed applicable Federal drinking water standards or criteria under average or or maximum plausible case exposure estimates. Under maximum plausible exposure conditions, estimates of mercury levels exceed the state water quality criterion for a potable water supply. The maximum case is based on a single soil sample with a mercury concentration one to two orders of magnitude above samples taken elsewhere at the site and, therefore, may not be representative of site conditions. Further, none of the indicator chemicals for which monitoring data are available have been detected in the Morgantown drinking water intake. The exposure models generally predict levels of organics below standard detection limits.

REMEDIAL ACTION OBJECTIVES

Based on the RI and the EA, remedial action efforts at the Ordnance Works Disposal site should address the following:

1. Soils in the landfill that exceed either the arsenic (20 mg/kg) or the CPAH (26 mg/kg) EA risk-based cleanup levels: contaminant concentrations for these parameters exceed the proposed cleanup

levels at nearly every depth sampled. Since the landfill materials are very heterogeneous, contaminant levels above cleanup levels are likely to occur anywhere in the landfill. As a result, the entire area is subject to evaluation for remediation.

2. Soils in the former lagoon area that exceed the CPAH risk-based cleanup level (26 mg/kg): these soils occur at depths of 4 to 6 feet in an area of approximately 0.7 acres.

3. Soils in the scraped area that exceed either the arsenic (20 mg/kg) or CPAH (26 mg/kg) risk-based cleanup levels: such soils occur from the surface to a depth of 8 feet in an area of approximately 0.4 acres.

4. Sediments in the surface-water area that exceed either the arsenic (20 mg/kg) or CPAH (26 mg/kg) risk-based cleanup levels. Unacceptable levels of these contaminants occurred at five sediment sampling locations and appear to occur in sediment collection areas downstream from the waste management location.

ALTERNATIVE EVALUATION

Based on the above objectives and data from the RI, several general response actions and associated remedial technologies were identified. The technologies were screened using technical, environmental, public health, institutional, and cost criteria. Institutional criteria were used to insure that each technology attains the ARARs of local, state, and federal statutes. The technologies that were retained for use in developing remedial action alternatives are the following:

No action with security upgrade and monitoring

Low-permeability soil cap

Multilayer cap

Regrading, revegetation, and water diversion

Collection ditches and sedimentation basins

Complete or partial removal of wastes

Disposal in a secure on-site landfill

Disposal in a secure off-site landfill

Treatment using on-site incineration

Treatment using off-site incineration

Remedial action alternatives were formulated by combining technologies retained during the technology screening process in accordance with guidelines established in the National Contingency Plan (NCP), Superfund Amendments and Reauthorization Act (SARA), and the previously developed remedial objectives. The Remedial Alternatives considered are as follows:

Alternative 1 - No Action with Site Security

The purpose of presenting a no-action alternative is to provide a basis for comparing existing site conditions with those resulting from the implementation of the other proposed alternatives. Under the no-action alternative, no additional measures will be used to remediate contamination sources or their potential migration pathways. The two major components of this alternative are:

° Installation of a 10-foot high chain-link fence around the scraped area, the former lagoon area, and the landfill.

° Implementation of a quarterly ground water monitoring program using six existing monitoring wells, and a semi-annual surface-water monitoring program at four locations between the waste management areas and the Monongahela River.

Technical Considerations

Activities associated with this alternative are limited to construction, operation, and maintenance of the chain-link fence.

Public Health and Environmental Concerns

° Surface and subsurface soils would continue to exceed clean-up levels for arsenic (20 mg/kg) and CPAHs (26 mg/kg) in the three waste management areas. Contaminant concentrations above these levels represent a cancer risk to human receptors.

° Without remediation, barriers would not exist to prevent site runoff from contributing additional contaminants to sediments. The risks presented by additional releases of CPAHs and arsenic into the local environment would remain or increase.

Institutional Requirements

° Does not meet remedial action objectives.

° Does not meet RCRA guidelines for cover systems or containment requirements for contaminants.

° Future site use would be restricted to industrial activities.

° Present site conditions would require improved erosion, sedimentation, and runoff controls to protect future conditions.

- Provisions for long-term site security inspections and monitoring would be required.

Comments

The no-action alternative does not attain ARARs. The estimated present-worth cost of this alternative is $787,000.

Alternative 2 - In-Situ Closure

Alternative 2 involves the in-situ closure of the landfill, the former lagoon area, and the scraped area. Areas of concern would be capped, regraded, and vegetated. The major components of this remedial alternative include the following activities:

- Capping (using a low permeability cap system) of locations in the lagoon area in which elevated concentrations of CPAHs (greater than 26 mg/kg) were detected in subsurface soil samples.
- Capping (using a low permeability cap system) of locations in the scraped area in which elevated concentrations of CPAHs and arsenic were detected.
- Dredging of contaminated sediments found in settling zones downgradient of the waste management areas, and disposal of the dredged materials in the landfill prior to placement of the cap system.
- Consolidation of existing landfill waste and debris and application of a multi-layer cap system which conforms to RCRA.
- Grading and vegetation of cap systems covering the former lagoon, scraped area, and landfill to promote positive drainage.
- Extensive surface management for erosion and sediment control. Placement of geotextile silt fences, sedimentation basins, and/or diversion to control off-site soil transport and to divert surface-water flow.
- Ambient air monitoring.
- Post-remediation monitoring.

Technical Considerations

- Capping is a proven technology.
- Potential for leakage of contaminants will be abated with a RCRA multi-layer cap for the on-site landfill.
- Cap installation in portions of the landfill may prove difficult due to limited accessibility.

Public Health and Environmental Concerns

- Public health and environmental risks from direct soil contact would be mitigated. Migration of contaminants by surface percolation would be eliminated.
- Dredging is anticipated to have a significant adverse short-term impact on the local ecosystem. Restoration would include revegetation with endemic varieties.
- Surface capping would reduce migration of contaminants via surface-water runoff and sediment transport.
- Long-term monitoring would be required.

Institutional Requirements

- Multi-layer and low permeability cap systems must comply with RCRA guidelines.
- Erosion, sediment, and dust control measures must be implemented during excavation and cap installation to comply with state ordinances.
- Safety protocols consistent with Occupational Safety & Health Administration (OSHA) guidelines must be developed for excavation and construction activities.
- Excavation and construction activities must comply with local regulations.
- Land-use restrictions would be necessary to prohibit intrusive activities in capped areas.
- Provisions for long-term monitoring must be available.

Comments

This alternative does not reduce toxicity or volume of contaminants but will reduce mobility. In-situ closure will meet all ARARs.

The estimated present-worth cost of this alternative is $1,707,000.

Alternative 3 - Partial Removal and Containment

Under alternative 3, contaminated soils near the scraped area, existing landfill, and former lagoon area would be addressed. The specific actions included in this alternative are as follows:

- Excavation and on-site staging of all landfill wastes and debris.

- The existing landfill would be reconstructed to conform to RCRA standards and would include a multi-layer cap and liner systems. The reconstructed landfill would be used for the disposal of excavated waste materials and soils from the landfill, soils from the lagoon area and the scraped area, and sediments from the stream.

- Grading and vegetation of the cap system covering the newly constructed landfill to promote positive drainage.

- Excavation of soil with elevated concentrations of CPAHs and arsenic located in the scraped area followed by placement in the on-site containment area (landfill). Areas of concern correspond to test pit locations SCA-02 (arsenic concentrations >20 mg/kg) and SCA-03 (CPAH concentrations >26 mg/kg).

- Excavation of soil with elevated levels of CPAHs located in the lagoon area (CPAH concentrations >26 mg/kg) followed by placement in the on-site containment area.

- Backfilling, regrading, and revegetation of the lagoon and scraped areas impacted during excavation.

- Dredging of sediments found in the settling zones downgradient of the waste management areas and disposal of the dredged materials in the landfill prior to placement of the capping system.

- Extensive surface management for erosion and sediment control. Placement of geotextile silt fences, sedimentation basins, and/or diversion to control off-site soil transport and to divert surface water flow.

- Ambient air monitoring during remediation.

- Post-remediation monitoring.

<u>Technical Considerations</u>

- Combination of two proven technologies (partial removal and containment) to achieve long-term remediation.

- Effectively reduces potential mobility of contaminants.

- Excavation of landfill wastes may be difficult to implement.

<u>Public Health and Environmental Concerns</u>

- Addresses all environmental issues and contaminant pathways identified in the RI.

- Reduces the areal extent of contamination, thereby minimizing areas of concern on-site.
- Partial removal/containment in an on-site RCRA landfill is expected to reduce or eliminate public health risks and environmental impacts resulting from contamination migration via surface water runoff and sediment transport.
- The added liner system will provide bottom control that is not included in Alternative 2. The possibility of downward contaminant migration appears to be insignificant, however, because of the relative immobility of the contaminants.
- Excavation activities may present short term public health risks from dust and/or airborne volatile organics. These risks would be evaluated by air monitoring and addressed appropriately.
- Dredging is anticipated to have a significant adverse short-term impact on the local ecosystem. Restoration would include revegetation with endemic varieties.

Institutional Requirements

- The landfill multi-layer cap and liner system are designed to comply with RCRA guidelines.
- Erosion, sediment, and dust control measures must be implemented during excavation and construction activities to comply with state ordinances.
- Safety protocols consistent with OSHA guidelines must be developed for excavation and construction activities.
- Land use restrictions would be necessary to prohibit intrusive activities in capped area. Restrictions would be less stringent than under Alternatives 1 or 2 because of the decrease in areal extent of contamination.
- Provisions must be made for long-term leachate collection and removal from the landfill.
- Provisions must be made for long-term monitoring after remediation.
- Excavation and construction activities must comply with local regulations.

Comments

This alternative does not reduce the toxicity or volume of contaminants but will reduce mobility. Partial removal and containment will meet all ARARs.

The estimated present-worth cost of this alternative is $3,517,000.

Alternative 4 - On-Site Incineration with Containment

The on-site incineration and containment option would be used to treat, contaminated soils found in the scraped area and former lagoon area, and sediments removed from the identified streams. A multi-layer cap that meets RCRA design standards would be constructed on the inactive landfill to prevent potential migration of organic and inorganic contaminants from that area. The components of Alternative 4 are the following:

- Excavation and incineration of soils found in the former lagoon and scraped areas and sediments removed from impacted stream locations (CPAH concentration >26 mg/kg, arsenic concentration >20 mg/kg). Ash generated by this process will be placed in the landfill prior to installation of the RCRA cap (assuming the ash is not EP toxic).

- Placement of clean fill in the excavated area, followed by grading and revegetation of the area to provide controlled drainage patterns.

- Consolidation of the existing landfill waste (i.e., the exposed northern face of the landfill) and application of a multi-layer cap system that meets RCRA design standards.

- Implementation of surface management techniques for drainage and sediment control in the landfill area. These measures will include silt fences, sedimentation basins, and surface-water flow controls.

- Ambient air monitoring.

- Post-treatment monitoring.

Technical Consideration

- On-site treatment using a mobile incineration unit is well-suited in this instance. The materials to be incinerated are fairly homogeneous; presorting efforts would therefore be mimimal. The system would probably require a mobile incinerator to operate 5 to 7 months to complete this project (mobile unit capacity is 100 cubic yards/day). A trial burn to illustrate contaminant destruction and air quality would be necessary. Air pollution control and ash handling equipment would be required.

- Landfill capping is a proven technology. Cap installation in portions of the landfill will be difficult because of the landfill's topography and limited accessibility.

Public Health and Environmental Concerns

- Public and environmental risks from direct soil contact would be mitigated.

- Surface capping would reduce migration of contaminants via surface runoff and sediment transport.

- This alternative addresses all of the environmental issues and migration pathways presented in the RI.

- Incineration of contaminants would eliminate the potential public health risks resulting from contaminant migration via surface runoff. Excavation and treatment activities may present short-term public health risks from dust and/or airborne volatile organics. These risks would be evaluated by air monitoring and addressed appropriately.

- Organic contaminants would be permanently destroyed in waste/soils that are suitable for treatment. The environmental concern that remains pertains to the unknown fate of inorganics in the ash.

- Dredging is anticipated to have a significant adverse short term impact on the local ecosystem. Restoration would include revegetation with endemic varieties.

Institutional Requirements

- This alternative contemplates use of a destruction technique applied to contaminants that may be easily fed into an incinerator. Destruction techniques are viewed very favorably as site remediation alternatives under SARA.

- Under SARA, permits may not be required for on-site incineration or discharge of scrubber water. Regulatory agency approval would be required for the construction and operation of the incineration unit to ensure compliance with applicable state and Federal regulations governing hazardous waste treatment facilities.

- A trial burn will be necessary to determine the performance of the air emission controls and the efficiency with which organic contaminants are destroyed. Scrubbers and/or baghouses may be required to control particulate and residual chemical constituents. Scrubber water must meet all Federal and state regulations prior to discharge.

- Ash generated from the incineration process will be stored in water-tight bins approximately 20 cubic yards in size. A sample from each bin will be collected and analyzed for EP toxicity. Ash that is determined to be EP non-toxic will be placed in the on-site landfill prior to capping. If the ash tests positive for EP toxicity, it will be placed in an appropriate RCRA-approved facility. Based on the present level of contaminants in the soil, it is anticipated that most, if not all of the ash, will not be EP toxic.

- Erosion, sediment, and dust control measures must be implemented during excavation, construction, and treatment to comply with local regulations.

- Excavation and construction activities must comply with local regulations.

- Land use restrictions that prohibit intrusive activities in capped areas would apply to future site use.

- Provisions for a long-term monitoring program after remediation must be provided.

Comments

This alternative reduces the mobility, toxicity, and volume of the contaminants. On-site incineration with containment meets or exceeds all ARARs.

The present-worth cost of this alternative is $6,718,000.

Alternative 5 - On-Site Incineration and Disposal

The on-site incineration and disposal option would permanently reduce the toxicity of specified organic contaminants. Treatment would be performed on contaminated soils taken from the scraped area, landfill, and lagoon area, and on contaminanted sediments removed from the identified streams. The components of Alternative 5 are the following:

- Excavation of areas of concern in the former lagoon area and the scraped area (CPAH concentrations >26 mg/kg; arsenic concentrations >20 mg/kg) and incineration of soils for organics destruction.

Option A: Disposal of incinerator ash in a reconstructed, on-site landfill. The reconstructed landfill would meet RCRA requirements, including multilayer cap and liner systems. Option B: Assuming ash is nonhazardous, backfill in excavated areas.

- Excavation of in-place waste material from the landfill and collection of extraneous landfill debris. Separation of incinerable waste from unincinerable debris. Construction of an on-site RCRA landfill with multi-layer cap and liner system. Incineration of appropriate wastes for organics destruction. Option A: Disposal of presorted and treated material in on-site RCRA landfill. Option B: Backfill non-hazardous ash in excavated areas and dispose of unincinerable debris in on-site RCRA landfill.

- Grading and revegetation of all three waste management areas to promote positive drainage.

- Dredging and incineration of contaminated sediments found in the settling zones downgradient of the waste management areas. Option A: Disposal in on-site RCRA landfill. Option B: Backfill with other treated soil.

- Extensive surface management designed to address erosion and sediment control. Placement of geotextile silt fences, sedimentation basins, and/or diversion to control off-site soil transport and to divert surface water flow.

- Ambient air monitoring.

- Post-treatment monitoring.

Technical Considerations

- On-site incineration is a promising technology that has proven successful in the past. Not all waste at the Morgantown site is suitable for incineration; extensive presorting and a trial burn of all potentially incinerable materials are necessary. Pollution control and disposal of ash product is required.

- Excavation/dredging for conventional applications is feasible and common practice at site remediations.

Public Health and Environmental Concerns

- This alternative addresses all of the environmental issues and migration pathways identified in the RI.

- Reduces the areal extent of contamination, thereby minimizing areas of concern onsite.

- Treatment and on-site disposal is expected to significantly reduce or eliminate the potential public health risks and environmental impacts resulting from contaminant migration via surface water runoff and migration of contaminated sediments.

- Excavation and treatment activities may present short-term public health risks from dust and/or airborne volatile organics. These risks would be evaluated by air monitoring and addressed appropriately.

- Organic contaminants are permanently destroyed in waste/soils that are suitable for treatment. The environmental concern that remains pertains to the unknown fate of the inorganics in the ash.

- Dredging is anticipated to have a significant adverse short-term impact on the local ecosystem. Restoration would include revegetation with endemic varieties.

Institutional Requirements

- Under SARA, permits may not be required for on-site incineration or discharge of scrubber waters. Regulatory agency approval would be required for the construction and operation of the incineration unit to ensure compliance with all applicable state and Federal regulations governing hazardous waste treatment facilities.

- A trial burn will be necessary to determine the performance of the air emission controls and the efficiency with which organic contaminants are destroyed. Scrubbers and/or baghouses may be required to control particulate and residual chemical constituents. Scrubber water must meet all Federal and state regulations prior to discharge.

- Ash generated from the incineration process must be regularly tested to determine the mobility of EP toxic metals. Classification of the ash as hazardous or nonhazardous will determine if the ash should be placed in the reconstructed RCRA landfill or backfilled in the excavated areas.

- Erosion, sediment, and dust control measures must be implemented during excavation, construction, and treatment to comply with local regulations.

- Excavation and construction activities must comply with local regulations.
- Funding must be available for a long-term monitoring program.

Comments

This alternative reduces the mobility, toxicity, and volume of the contaminants. On-site incineration and disposal exceeds all ARARs.

The present worth cost of this alternative is $16,891,000 for Option A and $16,212,000 for Option B.

Alternative 6 - Removal/Off-Site Option

This alternative consists of excavation and removal of all sources of significant contamination and disposal or treatment of the removed materials at an EPA-approved off-site facility. The treatment alternative would involve incineration while the disposal option would be a RCRA-approved landfill. This removal/off-site option would apply to contaminated soils and wastes in the lagoon, landfill, and scraped areas, and sediments in specified locations. The major components of this remedial alternative include:

- Complete excavation of the landfill, former lagoon area, and the scraped area.
- Dredging of contaminated sediments found in the settling zones downgradient of the waste management areas for subsequent off-site treatment/disposal.
- Ambient air monitoring.
- Backfill, regrading, and revegetation of excavated areas. The landfill will not require extensive backfilling since it was originally a natural ravine into which wastes were subsequently disposed.
- Off-site disposal/treatment options include the following:

  1) Contaminated soils and materials that could be incinerated would be transported to a commercial incinerator facility for treatment.

  2) The remaining materials would be disposed of in a RCRA-approved secure landfill. Some materials deemed for disposal may require stabilization prior to transportation to the disposal facility.

- Post-remediation monitoring.

Technical Considerations

- Excavation prior to off-site disposal/treatment is feasible for conventional applications and uses common practices.

- Technical considerations for the two off-site options:

  1) Off-site incineration is a promising technology that has proven successful in the past. Commercial facilities are available to implement this alternative. Representative samples of waste must be accepted prior to material treatment; space must be scheduled in advance. Most facilities impose a surcharge for soils for ash disposal costs.

  2) Off-site disposal in a RCRA-approved landfill is feasible and is based on well developed techniques and standard engineering practices. RCRA requirements provide for a secure area to dispose of the hazardous materials. Timing is important since capacity is limited and space must be scheduled.

Public Health and Environmental Concerns

- Addresses all environmental issues and contaminant pathways identified in the RI.

- This alternative calls for removal of the contamination. This can be expected to significantly reduce or eliminate the potential public health risks and environmental impacts resulting from contaminant migration via surface-water runoff and sediments.

- Dredging activities are expected to have significant short-term adverse impacts on the local ecosystem. Restoration would include revegetation with endemic varieties.

- Excavation and treatment activities may present short-term public health risks from dust and/or airborne volatile organics. Those risks would be evaluated by air monitoring and addressed appropriately.

- Additional public health and environmental issues specific to the two treatment options:

  1) Off-site incineration

- Eliminates any long-term impacts to local public health and the environment because hazardous materials are removed from the site and are permanently destroyed.

- Potential short-term impacts are associated with transportation of contaminated materials.

  2) Off-site disposal in a RCRA landfill

- Contaminated materials would be removed and placed in a more secure location, therefore eliminating any impacts on local public health and the environment.

- Possibility of long-term impacts to the local area off-site if landfill failure occurred because contaminated materials would not be treated.

Institutional Requirements

- Minimum public opposition is anticipated.

- State erosion, sediment, and dust control ordinances require compliance during excavation activities.

- Approved licensed haulers for transport to the off-site facility must be obtained in compliance with U.S. Department of Transportation guidelines.

- Long-term funding must be made available for the post-remediation monitoring program.

- Additional institutional considerations specific to the off-site options:

  1) Off-site incineration

  - Repacking of bulk materials will likely be required prior to shipment.

  - Incinerator time is limited and must be scheduled. Term of project contingent upon acceptance of wastes at the facility.

  2) Off-site disposal in RCRA landfill

  - Landfill capacity is limited. Success of this alternative is contingent upon acceptance of the excavated wastes.

  - The disposal of material in a permitted landfill is governed by State and Federal regulations.

  - Potential liability remains in the the event of landfill failure.

Comments

This alternative provides for treatment/disposal at an off-site facility and meets all applicable or relevant and appropriate requirements.

The present-worth cost of this alternative is $30,353,000.

Action Specific ARARs

Table 6 presents a summary of the action specific Federal and State ARARs and the affected alternative(s).

Recommended Alternative

Section 121 of CERCLA establishes cleanup standards for site remediation and articulates a preference for remedial actions in which treatment permanently and significantly reduces the volume, toxicity, or mobility of site contaminants. The provision notes that off-site transport and disposal of hazardous substances without such treatment is least favored where practicable treatment technologies are available. The statute mandates selection of a remedial action "that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery techniques to the maximum extent practicable".

EPA has reviewed and considered these statutory provisions and the regulations contained in the National Contingency Plan in light of the conditions present at the Morgantown Ordnance Works site and concludes that Alternative 4 is most consistent with these guidelines. This remediation alternative offers the best combination of effectiveness, implementability, and cost efficiency and involves use of a permanent solution (treatment of contaminated soils and sediments by incineration) in conjunction with a containment feature (capping the existing landfill). This remedy meets or exceeds all applicable or relevant and appropriate requirements.

Alternative 1, No Action with Site Security, was rejected because surface and subsurface soils would continue to exceed cleanup levels for arsenic and CPAHs in the three waste management areas. This alternative did not meet the remedial action objectives nor does it attain ARARs.

Alternative 2, In-Situ Closure, and Alternative 3, Partial Removal and Containment, both meet all ARARs but do not permanently or significantly reduce the toxicity or volume of contaminants.

Alternative 5, On-Site Incineration and Disposal, exceeds all ARARs and similar to Alternative 4, will permanently and significantly reduce the mobility, toxicity, and volume of contaminants. Although Alternative 5 is slightly more protective of the environment, Alternative 4 will provide nearly the same protection to the environment for a significantly reduced cost, therefore Alternative 4 is a more cost-efficient solution.

TABLE 6

SUMMARY OF APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs)

ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

ACTIVITY	STATUTE/REGULATION	REQUIREMENT	ALTERNATIVE(S)
RCRA Cap	-40 CFR 264.228,310 -West Virginia Hazardous Waste Regulations, Title 47.	• Placement of a cap over waste designed and constructed to: - Provide long-term migration minimization of liquids through the capped area. - Function with minimum maintenance. - Promote drainage and minimize erosion or abrasion of the cover. - Accommodate settling and subsidence so that the cover's integrity is maintained. - Have a permeability less than or equal to the permeability of any bottom liner system or natural sub-soils present, or 1 x 10^{-7} cm/sec, whichever is less (specific to West Virginia, Title 47). • Eliminate free liquids and stabilize wastes before capping. • Restrict post-closure use of property as necessary to prevent damage to the cover. • Prevent run-on and run-off from damaging cover. • Protect and maintain surveyed benchmarks used to locate waste cells.	2,3,4,5

TABLE 6

ACTIVITY	STATUTE/REGULATION	REQUIREMENT	ALTERNATIVE(S)
RCRA Landfill	-40 CFR 264.300-310 -West Virginia Hazardous Waste Regulations, Title 47.	• A double liner designed to prevent migration of wastes at any time (including closure) during the operation of the landfill. • A leachate collection and removal system immediately above the liner. • During construction, liners and cover systems must be examined for uniformity, damage and imperfections. • Proper surveying and record keeping (location and dimensions of each cell, approximate location of each hazardous waste type in each cell). • Upon closure, a cap must be provided that fulfills the requirements out-lined previously (see RCRA Cap).	3,5
On-Site Incineration	-40 CFR 264.340-351 -West Virginia Air Pollution Control Regulations, Chapters 16-20, Regulations VI, XV	• Analyze the waste feed. • Dispose of all hazardous waste and residues, including ash, scrubber water, and scrubber sludge. • Performance standards for incinerators: - Achieve a destruction and removal efficiency of 99.99% for each principal organic hazardous constituent in the waste feed:	4,5

TABLE

ACTIVITY	STATUTE/REGULATION	REQUIREMENT	ALTERNATIVE(S)
		- Reduce hydrogen chloride emissions to 1.8 kg/hr or 1% of the HCl in the stack gases before entering any pollution control devices. - Emit particulates in levels not exceeding those outlined in 40 CFR 264.344 and the West Virginia Air Pollution Control Regulations. ● Monitoring of various parameters during operation of the incinerator is required. These parameters include: - Combustion temperature - Waste feed rate - Combustion gas velocity - Carbon monoxide.	
Clean Closure (Waste Removal)	40 CFR 264.11,223	● General performance standards require minimization of need for further and maintenance and control; elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, and hazardous waste decomposition products. ● Disposal or decontamination of equipment, structures, and soils.	2,3,4,5,6

TABLE 6

ACTIVITY	STATUTE/REGULATION	REQUIREMENT	ALTERNATIVE(S)
		• Removal or decontamination of all waste residues, contaminated containment system components (e.g. liners, dikes), and contaminated subsoils, as well as structures and equipment contaminated with waste and leachate, and management of them as hazardous waste. • Meet health-based levels at unit.	
Waste Transportation	40 CFR 263.11-33 49 CFR 171-179	• EPA Identification Number must be obtained from the Administrator • Properly used and maintained shipping manifests. • Shipments must follow DOT regulations codified in 49 CFR 171-179.	6
NPDES Permitting	40 CFR 122.1 West Virginia Administrative Regulations, State Water Resources Board. Chapter 20-5A.	• Requires permits for the discharge of "pollutants" from any "point source" (water discharge from air pollution control device) into waters of the United States.	4,5

Alternative 6, Removal/Off-Site Option, was not chosen because Section 121 of CERCLA notes that off-site disposal of hazardous substances prior to treatment is the least favored alternative when practical treatment technologies are available.

Alternative 4, On-Site Incineration with Containment is designed to treat contaminated soils found in the former lagoon area and the scraped area, as well as sediments found in the settling zones of the three streams downgradient of the waste management area. A multi-layer cap that meets RCRA design standards will be constructed on the inactive landfill. The cap will be extended into the subsurface clay to prevent both surface water infiltration and seeps out of the landfill area.

Test pits and soil borings in the landfill area identified a clay layer at depths ranging from 12 to 20 feet and a thickness of 2 to 5 feet. Additional test borings in the landfill area will be required during the remedial design to confirm the depth and thickness of the clay and to conduct geotechnical testing for the design parameters.

Since the source of contamination in the landfill will remain in-place, the potential for release of contaminants into the environment must be addressed. Such a release might occur from cap failure or from the unforseen migration of contaminants through subsurface soils. If the RCRA cap is properly installed, it is unlikely that cap failure would occur and lead to contaminant release. Section 7 of the FS noted that this technology is effective and has long-term durability. In addition, the existing clay stratum beneath the landfill may be a sufficient bottom liner; groundwater contamination was not detected during the RI and CPAHs are, by nature, immobile. Geotechnical testing of the soil and post-closure monitoring will be used to evaluate the performance characteristics of this clay layer.

Alternative 4 also includes the removal and treatment of contaminated soils and sediments found in the designated areas. Treatment by thermal oxidation (incineration) should reduce the toxicity of organic contaminants contained in the removed materials by neutralizing CPAHs to form carbon dioxide and water.

The trial burns will determine the efficiency with which the organic constituents are destroyed and the performance of the air emmission controls. Effluent streams from the incinerator include gaseous emissions and an ash product. Scrubbers and/or baghouses may be required to control particulate and residual chemical constituents which result from incineration. If scrubbers are used, scrubber water must be monitored prior to discharge. Since the Monongahela River is the likely recipient of the scrubber water, the requirements of a NPDES permit must be implemented. Ash generated during the trial burn must be tested for EP toxicity. Based on the level of inorganic constituents present in the soils and sediments, it is anticipated that the ash will not be EP toxic and may therefore be disposed on-site in the landfill prior to capping. Ash that tests positive for EP toxicity will be transported to a RCRA-approved facility.

This alternative includes a destruction technique applicable to soils and sediments that can be readily excavated and fed into an incinerator. Destruction techniques are viewed favorably for site remediation under SARA since the toxicity and volume of the waste materials are reduced.

The selected remedy offers the best combination of effectiveness, implementability, and cost efficiency in comparison to the other alternatives by combining a permanent solution (incineration of soils and sediments) with containment (RCRA cap). In addition, this remedy meets or exceeds all applicable or relevant and appropriate requirements.

The landfill contains a large amount of extraneous debris that would require extensive presorting prior to incineration. The proposed RCRA cap will be extended into the subsurface clay and will mitigate the immediate public health and environmental risks from direct contact with contaminated soils. In order to verify the anticipated long term reliability and integrity of the cap, a ground water monitoring program for the landfill will be developed during the remedial design. This monitoring program will be in general conformity with the RCRA Ground Water Monitoring Technical Enforcement Guidance Document, September, 1986.

It is estimated that this alternative will take 2 to 3 years to complete with actual field activities occuring during a 6 to 12 month period. Remedial design activities should begin in the fall of 1988. On-site monitoring will be conducted over a 30 year period.

Statement of Findings

As part of the recommended remedial action for this site, excavation of soils in the lagoon area and sediments in the impacted stream locations is proposed. Based on a wetland delineation conducted at the site on April 1, 1986 by Ms. Libby Rhodes and Mr. Nels Barrett of the Environmental Assessment Branch, there are significant wetlands associated with the lagoon and streams on this site. It is our belief that any remedial action taken in the lagoon area will impact the intermittent stream wetlands.

The total impact to the wetlands are unknown at this time and will not be determined until during the remedial design. During the design, the impact to the wetland area must be evaluated and the design must include all practical measures that can be taken to protect all wetland areas and minimize damage to the environment. This analysis must also include all necessary mitigative measures.

Future Activities

Review of analytical data from the DOD industrial area indicates the presence of hazardous substances in concentrations exceeding background levels. This data was generated from tests performed on surface soils and surface water only. Subsurface soil conditions in this area have not been investigated. The investigation will likely be difficult as a result of abandoned buildings and concrete foundations of demolished buildings which remain on-site. In addition, samples have not been collected from the potential contamination pathways identified in this area.

Additional testing is recommended to complete the investigation of the DOD industrial area. The additional testing efforts should include, but not be limited to:

- Installation and sampling of ground water wells to evaluate potential contamination pathways and the local hydrogeology of this area.
- Sampling of the four identified surface water streams leaving this area to define potential contamination pathways.
- Surface and subsurface soil sampling to define contamination source areas.

FINAL RESPONSIVENESS SUMMARY
MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

From February 16, 1988 through March 16, 1988, the U.S. Environmental Protection Agency (EPA) held a public comment period on the Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plan for the Morgantown Ordnance Works site in Morgantown, West Virginia. This document summarizes the comments, both written and verbal, on the RI/FS EPA received during the comment period by residents, local officials, and other interested parties; and presents EPA responses to those comments.

This responsiveness summary is divided into two sections:

- Section I: Site Background. This section provides a brief site history and discusses the EPA preferred alternative for remedial action.

- Section II: Summary of Comments and EPA responses.

I. SITE BACKGROUND

A. Site History

The Ordnance Works site is located approximately one mile southwest of Morgantown, West Virginia, on the west bank of the Monongahela River. The site is east of Interstate Highway 79 and south of U.S. Highway 19.

In 1940, E.I. duPont DeNemours and Company (DuPont) built and operated an ammonia production facility for the U.S. Department of War (now the Department of Defense), the original owner of the Ordnance Works property. Between 1946 and 1950, the U.S. Army Corps of Engineers awarded lease agreements to Sharon Steel Corporation to operate a coke plant on the property, and to Heyden Chemical Corporation to rehabilitate and operate an ammonia production facility. During the 1950's, the Olin Matheson Company leased the property from the U.S. Army Corps of Engineers and operated the plant to produce ammonia, methyl alcohol, formaldehyde, hexamine, and ethylene diamine.

In 1962, the property was purchased from the U.S. government by the Morgantown Community Association with funds supplied by J.W. Ruby of Sterling Faucet, Incorporated. The Morgantown Community Association turned title to the property over to a new corporation called Morgantown Ordnance Works, Incorporated, headed by J.W. Ruby. Sterling Faucet, Incorporated subsequently operated a chrome-plating plant on the property between 1962 and 1976. In 1964, Borg-Warner Chemicals, Incorporated purchased a 62-acre parcel from Morgantown Ordnance Works, Incorporated to operate an organic chemical plant on the property.

The current owners, Morgantown Industrial Park Associates, Limited Partnership (MIPA) bought the site from Princess Coals, Incorporated in 1982. At present, MIPA owns approximately 670 acres and leases buildings and land for industrial activities. Borg-Warner Chemicals continues to operate an organic chemical production facility on 62 acres of the site. The Monongahela

Railway Company and a number of private companies own the remaining 86 acres.

In October 1980, the State of West Virginia requested that EPA undertake a Remedial Investigation/Feasibility Study (RI/FS) of the site. The Ordnance Works site is currently classified by EPA as an enforcement lead site. Investigations of the site by EPA and the West Virginia Department of Natural Resources (WVDNR) have identified several areas of concern:

- A currently inactive landfill where various solid and chemical wastes were disposed that could potentially threaten human health and the environment;

- A "scraped" area adjacent to the landfill where solid wastes were buried, so called because the area is flat and lacks vegetation;

- Two former lagoons (closed in 1981) used for disposal of chrome-plating process wastes; and

- A former drum staging area where abandoned drums, including two containing polychlorinated byphenyls (PCBs) were collected during the initial site remedial activities. The drums were subsequently removed off site for disposal by a private contractor in compliance with EPA guidelines.

As of March 1987, EPA had completed Phases I and II of the Remedial Investigation (RI) to determine the extent and sources of site contamination; identify contaminant migration pathways; and verify contaminant removal by previous remedial actions. The feasibility study (FS) on the upper portion of the site was completed during the spring of 1987. Some investigative work may continue on the lower portion of the site because during the RI, samples were taken at a depth of only two feet. EPA intends to conduct additional sampling at greater depths.

The purpose of the RI was to determine the extent and sources of contamination, identify contaminant pathways, and verify contaminant removal by a previous remedial action conducted in 1984. RI activities included taking surface and subsurface soil samples using boreholes, test pits and sediment sampling; and sampling possible migration routes, including surface water and ground water; installing monitoring wells at the site; analyzing ground water; and taking air samples. The RI also included a study to assess the possible affect on the environment and public health should a hazardous substance from the site be released into the environment.

EPA developed the FS based on information obtained during the RI. The FS described and evaluated various ways of rendering the site harmless to public health and the environment. These alternatives, known as remedial alternatives, were evaluated against several criteria including:

- The technical feasibility of the alternative, including performance, reliability and safety;
- How easily the alternative could be implemented;
- How successfully the alternative would protect public health and the environment; and
- How much the alternative would cost.

EPA studied a variety of technologies for controlling the contaminants at the Morgantown site to determine which technology could remediate the contamination most effectively. The technologies judged to be the best for the site were described in detail in the FS and summarized in the Proposed Plan. The Proposed Plan also described EPA's preferred alternative for the Morgantown site and the basis for choosing that alternative.

After carefully considering each of the remedial alternatives presented in the FS, EPA's preferred alternative is Alternative 4, <u>On-site Incineration with Containment</u>. Under this alternative, an on-site mobile incinerator would destroy the organic compounds contained in the soil excavated from the scraped area, former lagoons, and dredged stream sediment. Special systems to handle the ash and exhaust from the incinerator would be used. The landfill would receive a multi-layer cap.

II. SUMMARY OF MAJOR COMMENTS AND EPA RESPONSES

EPA held a public comment period on the Morgantown site RI/FS and the Proposed Plan from February 16, 1988 through March 16, 1988 and conducted a public meeting at the Monongalia County Courthouse on March 3, 1988 at 7:30 p.m. EPA staff began the meeting by presenting a brief history of the site and explained how the Superfund process works. In addition, the staff presented the alternatives in the FS, and the basis for selecting Alternative 4 as the preferred alternative.

Only two questions were received during the meeting and the public comment period. These comments are summarized below followed by EPA's responses.

Question: When does the public comment period end?

EPA Response: The comment period is scheduled to end on March 16, 1988.

Question: One resident, a former Ordnance Works employee, commented he was unhappy about the "condition" of the facility and urged EPA to quickly address problems at the site.

EPA Response: For the area studied, the preferred alternative is fully protective of human health and the environment, can be implemented within a reasonable period of time, and is economically viable. Additional areas of the site, which showed little or no contamination after initial sampling, may undergo further subsurface sampling.

Administrative Record Index
not included.